

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

[FIFTH SERIES.]

No. 14. FEBRUARY 1879.

X.—*On some new and rare Hydroid Zoophytes (Sertulariidae and Thuiariidae) from Australia and New Zealand.*
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[Plates XVI.-XIX.]

THE Hydroid Fauna of Australia and New Zealand has been, perhaps, more fully investigated than that of any region of the earth's surface, with the exception of the European seas and the eastern coasts of North America. Its history, however, is contained as yet only in many detached and scattered papers; and no attempt has been made to gather together and to correlate the information contained in them.

The largest and most important collection ever brought home from the Australian seas was that described by Mr. Busk in the appendix to Macgillivray's 'Voyage of the Rattlesnake.' Besides numerous and most interesting Plumulariidae, it contained fifteen species of *Sertularia*, twelve of which are new and undescribed. Of these, many, unfortunately, were small or imperfect specimens, and fully half were destitute of gonangia. Six out of the fifteen species were collected off Cumberland Island or in the Louisiade archipelago, the remainder principally in the neighbourhood of Bass's Straits. No form, I believe, was found common to the two localities. It is much to be regretted that this most valuable collection was not described at greater length, and still

more that no figures of the specimens have ever been published. I have been able to identify two species only with forms contained in the present collection, viz. *S. elongata*, Lamx., and *S. operculata*, Linn.

In 1864, Senator Dr. Kirchenpauer published a valuable paper, in the 'Nova Acta,' on the genus *Dynamena* of Lamouroux, and also described two new species from the Australian seas. One of these, however, *D. fasciculata*, is synonymous with *S. operculata*. A few scattered entries regarding Australian forms are to be found in the works of Prof. Allman, Mr. Hincks, and others; but, so far as I am aware, no other important contribution to the history of the Australian Hydroids has yet been published.

The first special list of the New-Zealand species was given by Mr. Gray, in the appendix to Dieffenbach's 'New Zealand:' it contained four species only of Sertulariidae and Thuiariidae, besides a single *Aglaophenia*. This scanty list of four was considerably extended by Captain Hutton in 1872 (Trans. N.Z. Inst. vol. v. p. 256), who mentions eleven species, two of which are probably, however, merely varieties.

In 1874 Dr. Millen Coughtrey communicated a paper to the Otago Institute, in which he added in many particulars to Captain Hutton's results and described three new species. He also contributed a paper on the same subject to the Ann. & Mag. of Nat. Hist. (Jan. 1876), which is in substance the same as one published in the Trans. N.Z. Inst. vol. viii.

In 1875 Prof. Allman read a paper before the Linnean Society, in which he described a large number of new and interesting Hydroids from many widely scattered localities. Among these were five *Sertularelle* from New Zealand, of which three were new; and three species of Thuiariidae, one only of which was undescribed.

Among the older authorities on the Hydroida much valuable and interesting information is to be found. The works of Lamouroux and Lamarck especially contain accounts of very numerous species from southern localities. The descriptions for the most part err, according to our notions, on the side of excessive shortness, and have for that reason been entirely set aside or overlooked by many recent authors. But though a few species are thus rendered unrecognizable, a great many can be identified without any great difficulty or uncertainty.

I regret extremely being unable to obtain in Edinburgh Krauss's 'Beiträge zur Kenntniss der Zoophyten der Südsee,' published at Stuttgart in 1832.

A more minute and extended investigation will, in all pro-

bability, lead to most interesting results in regard to our knowledge of the distribution of the Hydroida. Many of them are singularly widespread, one or two (e. g. *S. operculata* and *Sertularella Gayi*) almost cosmopolitan. On the other hand, even when studying the Hydroid fauna of a comparatively restricted area, such as the Australasian seas, we become aware, somewhat dimly as yet, of the existence of several more or less distinct and circumscribed provinces. The Hydroids of Torres Straits and the Louisiade archipelago are, as has been already remarked, singularly different from those of the southern and south-eastern regions, e. g. Adelaide and Bass's Straits; and the forms inhabiting New Zealand are similarly distinct from the Australian species. *S. operculata* and *S. elongata* are, I believe, the only Sertularians which have hitherto been recorded on good authority from both localities. To these I can now add *Sertularella Johnstoni* (a common New-Zealand form, of which I possess specimens from Tasmania) and *Sertularia minima*, D'A. W. T.

For a most able and masterly sketch of the distribution of the Sertulariidae see the introduction to Prof. Allman's magnificent work on the gymnoblastic Hydroids.

The species described in the following pages have been accumulated from various sources. Many of the specimens were selected from the refuse of Harvey's great collection of Australasian seaweeds, a store which, once upon a time, yielded many new Polyzoa to Prof. Sir Wyville Thomson. Another portion were sent home by Dr. Ferd. Müller, chiefly from Adelaide and the Gulf of St. Vincent; while the remainder were principally collected in New Zealand by Dr. Jolliffe. The collection contained, in all, twenty forms belonging to the Sertulariidae and Thuiariidae, of which six are referable to the genus *Sertularella*, nine to *Sertularia*, four to *Thuiaria*, and one to *Pericladium*. Of these, ten are, I believe, new and undescribed; eight are known to us by the accounts of other authors; and the two which remain are, unfortunately, represented by such imperfect specimens that I am uncertain how to identify them with old species, and equally unwilling to designate them as new.

I have also obtained in the same collection six or seven species of *Aglaophenia*, about half of which I believe to be undescribed, and two or three Campanularians, which last, however, are in a sadly imperfect state of preservation. I hope shortly to be able to render an account of all these species.

I must here express my warmest thanks to Prof. Sir Wy-

ville Thomson for his kindness in permitting me to describe the present collection, and to Prof. Allman and Mr. Busk for much kindly given and highly valued assistance.

Sertularella neglecta, sp. nov. (Pl. XVI. fig. 1.)

Trophosome. Hydrocaulus attaining a height of about $\frac{3}{4}$ of an inch. Pinnæ alternate, rather irregular. Hydrothecæ long, tubular, gracefully curved, a very small portion only immersed; all directed somewhat towards one side of the stem; one, rather shorter than the rest, in the axil of each pinna; orifice triangular, with three long pointed teeth. Colour reddish brown.

Gonosome. Gonangia obovate, with close, strongly-marked transverse wrinkles, and a distinct and longish neck-orifice with two rounded teeth.

Locality. Australia (probably Bass's Straits) (*Dr. Harvey*).

My specimens of this species are all much shrivelled, so much so as to make the exact form of hydrothecæ and gonangia not easily ascertained. My figure, however, is, as far as I can judge, fairly accurate.

Sertularella fruticosa. (Pl. XVI. figs. 2, 2 a.)

Sertularia fruticosa, Esper, Hist. des Zoophytes, suppl.

Sertularia laxa, Lamarck, Hist. des Anim. sans Vertèbres, vol. ii. p. 116.

Trophosome. Hydrorhiza dense, fibrous, and matted. Hydrocaulus attaining a height of about 12 inches, strong, coarse, and woody. Pinnæ long, alternate, arranged at wide intervals. Hydrothecæ large, cup-shaped, distant, often almost subpedicellate; orifice wide, unstricted, margin entire.

Gonosome. Gonangia arising from the pinnæ, just below the base of a hydrotheca; small, not much larger than the hydrothecæ; obovate, smooth, margin entire, operculate (?).

Locality. New Zealand (*Dr. Jolliffe*).

This species is a most striking and conspicuous one, from the great size both of the hydrothecæ and of the whole zoophyte; and it is a matter, therefore, of some wonderment to me to find no mention of it in recent authors.

In general appearance it closely resembles *Campanularia juncea*, a form from Ceylon figured by Prof. Allman in the Journ. of the Linnean Society, vol. xii.; indeed the generic relations of both species are somewhat uncertain.

The capsules are singularly small for so large and robust a species. In one or two I think I can detect traces of an operculum; but they are too much shrivelled for such a structure to have been fully preserved.

Sertularella Johnstoni, Gray.

Sertularia Johnstoni, Hutton, Trans. N.Z. Inst. vol. v.; Coughtrey, Trans. N.Z. Inst. vol. vii.

Sertularella gracilis, Allman, MS.

Sertularella Johnstoni, Allman, Journ. Linn. Soc. vol. xii.

This species is well represented in the collections to which I have had access, and, indeed, seems to be of common and widespread occurrence. I have little or nothing to add to the full and accurate descriptions already published, save to corroborate Dr. Coughtrey's account of the gonangia. These, according to Dr. Allman, possess a "tubular orifice, which is situated excentrically on the truncated summit." My specimens, like Dr. Coughtrey's, show three distinct variations in the form of the gonangium. In the first the neck is tubular and elongated; in the second it is everted and infundibuliform; and in the third it is absent or inconspicuous.

I think it extremely probable that the excentric position of the neck, as shown in Prof. Allman's specimen, was only an accidental or abnormal variation from the more common type.

The specimens hitherto described seem all to have been obtained in New Zealand; but I also possess some sent home by Dr. Ferd. Müller from Van Diemen's Land.

Sertularella exigua. (Pl. XVI. fig. 3.)

Trophosome. Hydrorhiza rather stout, creeping. Hydrocaulus attaining a height of about .2 inch, unbranched, much twisted at the base. Hydrothecæ rather large, barrel-shaped, tumid, smooth or indistinctly wrinkled towards the mouth, diverging for about half their length; margin thickened, flexuous; aperture four-sided. Colour whitish.

Gonosome. A single gonangium to each hydrocaulus, attached close to the proximal end. Globular or obovate, strongly corrugated with transverse folds.

Locality. New Zealand (*Dr. Harvey*).

This is another very minute species, but one which I have had better opportunities of examining than the last.

The hydrothecæ are of a very definite and characteristic form, and differ entirely from all the varieties of *S. simplex* (?) figured by Dr. Coughtrey. The zoophyte occurs creeping upon small seaweeds.

Sertularella, sp. (Pl. XVI. fig. 4.)

Trophosome. Hydrocaulus minute, simple, divided by oblique joints into short internodes, each bearing a single hydro-

theca. Hydrothecæ barrel-shaped, strongly wrinkled, with a distinct neck, divergent for about half their length; orifice with four teeth.

Gonosome. Unknown.

Locality. Brown's River (*Dr. Harvey*).

I have only a tiny scrap (.2 inch in height) of the present species; and owing to this circumstance, and considering also the confusion which still exists among the smaller Australian and New-Zealand species, I do not as yet assign it a name.

The hydrothecæ are singularly like those of *S. tenella*, Hincks, but are more immersed and much closer together. I cannot detect any traces of an operculum. The species is not unlike the form figured as a variety of *S. simplex* by Dr. Coughtrey in pl. xx. fig. 10, *l. c.* The hydrothecæ, however, are closer together and exhibit less numerous wrinkles in my specimen.

Sertularella ramosa, sp. nov. (Pl. XVI. figs. 5, 5 a.)

Trophosome. Hydorrhiza consisting of short matted fibres. Hydrocaulus attaining a height of about 3 inches, strong and shrubby. Main stem flexuous, giving off alternate pinnæ often themselves pinnate. Internodes short; joints oblique and conspicuous. Hydrothecæ large, urceolate, somewhat tumid, smooth; upper third divergent, one to each internode; orifice four-sided, with short rounded teeth at the angles. Colour brown.

Gonosome. Gonangia long, ovate, smooth, with a distinct four-sided neck; orifice quadrangular, with four teeth.

Locality. New Zealand (*Dr. Jolliffe*).

This species, as regards the shape of the hydrothecæ, has affinities with *S. polyzonias*, Linn., or still more with *S. turgida*, Trask (Proc. Calif. Acad., March 1857). I found a tiny scrap of the present form among zoophytes from Bass's Straits (*Dr. Harvey*); it may, however, have got mixed up with them accidentally.

SERTULARIA, Linnæus (in part).

The very numerous species of *Sertularia* seem to me to resolve themselves naturally into three groups, two only of which are represented among the following species.

a. The first section is that whose type species may be taken as *S. pumila*—a very natural group characterized by the oppositely-paired arrangement and tubular form of the hydrothecæ, and by the possession of ovato-globular, usually smooth, go-

angia. As a general rule, the margins of the hydrothecæ are smooth or furnished with two teeth; the aperture of the gonangium is surrounded by a rim or collar, and is frequently provided with an operculum. *S. conferta*, Kirchenpauer, is an example of a species whose gonangia are strongly marked with transverse wrinkles.

It will be seen that this section, together with the genus *Diphasia*, Ag., comprehends nearly all the species formerly grouped under Lamouroux's genus *Dynamena*.

β. The second group may be typically represented by *S. abietina*, and includes forms with flexuous stems and flask-shaped alternate or subalternate hydrothecæ. The gonothecæ vary: in the type species and in *S. filicula* they are ovate and smooth; in *S. pulchella*, D'A. W. T., and in *S. elongata*, Lamouroux, they are elongated, with long spines at the top.

In *S. filicula* the hydrothecæ are sometimes, though not in typical specimens, almost opposite.

γ. The third section is well exemplified by *S. cupressina*, and contains comparatively few species. It may be defined as comprehending forms rather sparingly jointed, with alternate, tubular, deeply immersed hydrothecæ.

The forms belonging to this group approximate very closely to the genus *Thuiaria*. Indeed Prof. Allman, in a note to his paper in the twelfth volume of the Journ. of the Linn. Soc., declares that both *S. argentea* and *S. cupressina* are true Thuiarians. It seems to me, however, that *S. fusca* has more claims than any of them to be admitted among the Thuiariidæ, both the hydrothecæ and gonangia being strikingly and characteristically of a Thuiarian type. The gonangia of the two preceding species show affinities to the second form described above, as exhibited by the last-named group.

a. Type form *S. pumila*, Linn.

Sertularia flexilis, sp. nov. (Pl. XVII. figs. 1, 1 a.)

Trophosome. Hydrocaulus slender, attaining a height of about 8 inches. Pinnae alternate, given off at rather distant intervals. Hydrothecæ opposite, in pairs, subalternate on the main stem, one in the axil of each pinna, generally two pairs to each internode, tubular, distant, strongly divergent, those on the main stem less so than those on the pinnae. Aperture small, looking upwards, with one broad tooth on each side.

Gonosome. Gonangia attached just beneath the base of a hydrotheca, on the main stem only, and confined to the upper

part, globular, smooth; margin slightly everted; orifice with a round operculum.

Locality. Sealer's Cove (*Dr. Ferd. Müller*).

In the wide space which separates the pairs of hydrothecæ this species approaches *Dynamena distans* of Lamouroux. The two forms, however, have no other character in common.

A little cluster of specimens without gonangia, and from 1 to 3 inches high, which I have no doubt represent a young form of this species, are contained in Dr. Harvey's collection from Circular Head, Tasmania. They show the hydrorhiza to be fibrous, creeping, and inconspicuous. They have the stem rather stronger and the hydrotheca a little larger than is the case in the type specimens.

Sertularia flosculus, sp. nov. (Pl. XVII. figs. 2, 2 a.)

Trophosome. Hydrorhiza consisting of a slender creeping filament. Hydrocaulus attaining a height of about $\frac{3}{4}$ of an inch, very delicate. Pinnæ alternate, nearly perpendicular to the main stem. Hydrothecæ, on the pinnæ, opposite, in pairs, closely adnate, one pair to each internode; on the stem subalternate, one in the axil of each pinna. Hydrothecæ shortly tubular, divergent for about half their length; orifice small, looking upwards, with two short teeth. Colour yellowish white.

Gonosome. Unknown.

Locality. Profusely clothing a *Fucus* from Australia (Adelaide?) (*Dr. Ferd. Müller*).

This is a singularly delicate and beautiful species, which, however, becomes greatly shrivelled in the process of drying. It has some affinities, and may possibly prove identical, with *Dynamena divergens* of Lamouroux.

Sertularia minima. (Pl. XVII. figs. 3, 3 a, 3 b.)

Syntheceium gracile, Coughtrey, Trans. N.Z. Inst. vol. vii. p. 286.

Sertularia pumila, Coughtrey, Ann. & Mag. Nat. Hist., Jan. 1876.

Trophosome. Hydrocaulus simple, attaining a height of .1 to .25 inch, springing from a delicate creeping hydrorhiza which forms a filamentous network overrunning seaweeds; branches erect; internodes marked off by a deep constriction. Hydrothecæ small, tubiform, adnate nearly their whole length, closely approximated; orifice cleft, forming two teeth.

Gonosome. Gonangia, one to each hydrocaulus, arising from a point just below the lowest pair of hydrothecæ; globular or somewhat pear-shaped; margin slightly everted, entire.

This little species, formerly described by Dr. Coughtrey as a second species of Allman's singular genus *Syntheticium*, was afterwards stated by him to be inseparable from *Sertularia pumila*. While it is plain that it can by no means be referred to the former genus, there also seem to be ample grounds for constituting it a distinct species of the latter one. It is undoubtedly very closely allied to *S. pumila*, L., and to *S. gracilis*, Hincks; but it differs markedly from both in the small size both of the trophosome and of the individual hydrothecæ. The teeth also on the margins of the hydrothecæ seem larger and more distinct than in the British species.

My specimens are of a whitish colour, and occur densely investing a species of *Fucus* (?)

Locality. Gulf of St. Vincent, Adelaide (*Dr. Ferd. Müller*); Australia (*Dr. Harvey*). Dr. Coughtrey's specimens were from the Middle Island, New Zealand.

Sertularia australis, Kirchenpauer.

(Pl. XVII. figs. 4, 4 a.)

Sertularia rufa, D. W. T., MS.

Trophosome. Hydrorhiza filiform, creeping. Hydrocaulus attaining a height of about an inch, much twisted at the base. Pinnæ alternate. Hydrothecæ on the pinnæ opposite, in pairs, closely adnate, one or two pairs to each internode; on the stem subalternate, one in the axil of each pinna. Hydrothecæ tubular, a small part only divergent; smooth; orifice small, directed outwards, provided with two teeth. Colour reddish.

Gonosome. Gonangia attached to the main stem only; globular or ovate, smooth; margin everted; aperture operculate.

Localities. Sealer's Cove, Port Philip, Cape Lefébre (*Dr. Ferd. Müller*); George Town (*Dr. Harvey*).

This little species occurs, investing seaweeds, in some abundance, and with very numerous gonangia, from the above localities. I have now no doubt that my specimens correspond with Kirchenpauer's species (*S. australis*), founded on an example from Port Philip, though I at first separated them on account of one or two slight points of difference. In my specimens, for instance, the hydrothecæ are longer and more tubular, the gonothecæ seem a shade smaller and more globular, and the zoophyte is coarser and less graceful feathery. These variations are not, however, sufficient for the foundation of a new species.

The dried specimens are harsh and brittle to the touch; and the colour is a distinctive and characteristic reddish brown.

Sertularia, sp. (Pl. XVIII. figs. 1, 1 a, 1 b.)

Trophosome. Hydrocaulus attaining a height of about four inches. Pinnæ alternate. Hydrothecæ opposite, in pairs, on the pinnæ; closely approximated, tubular, rather long, diverging for about a third of their length; alternate, on the stem, one in the axil of each pinna; orifice small, with two teeth. Colour reddish brown.

Gonosome. Unknown.

Locality. Gulf of St. Vincent (*Dr. Ferd. Müller*).

I only possess a single small example of this species, unfortunately without gonangia; and I therefore hesitate, in the absence of fuller information, as to giving it a new specific name. It may possibly be referable to the genus *Diphasia*.

Sertularia operculata (?).

Dynamena bispinosa, Gray.

Dynamena fasciculata, Kirchenpauer, Nova Acta Acad. Leop. vol. xxxi. (1863).

Sertularia bispinosa, Hutton, Coughtrey, &c.

After a long and careful examination of a very large series of specimens, both of the Australasian variety and of the common British species, I am forced to the conclusion that, as yet, we have really no evidence to justify the separation of the two forms.

The present form, whether specifically distinct or not, has long been known from southern localities. Dr. Johnston examined specimens from the Cape of Good Hope which "differed in no respect from those of our shores." Prof. Busk, in describing the zoophytes of the 'Rattlesnake' expedition (Macgillivray's *Voy. of the 'Rattlesnake,'* vol. i. app.), says, "This species occurs in all parts of the world. It is to be carefully distinguished from *D. bispinosa*, Gray, also an Australian and New-Zealand species." But in a report on some specimens from South Africa (Brit. Assoc. Report, 1850, p. 118), he says "The *Sert. operculata* of S. Africa is undoubtedly the same species as the British, although from a rather general deviation from the more usual tothing of the margin of the cell, which obtains in specimens from the southern hemisphere, this variety has been denominated *S. bispinosa* by Mr. Gray." Mr. Hincks, also, seems to acquiesce in the above opinion.

On the other hand, Mr. Gray, as we have seen, unhesitatingly described his specimens as a new species under the name of *Dyn. bispinosa*, and is supported in his opinion by Captain Hutton and Dr. Coughtrey. Again, Dr. Kirchenpauer, overlooking Gray's paper, described the form, of which

he gives an admirable figure, under the new name of *Dyn. fasciculata*. He says (*loc. cit.*), "Die Zellen sind ungefähr so geformt, wie bei der bekannten *D. operculata*, nur sind die beiden Spitzen des Randes länger, schmaler, weiter von einander entfernt." This is, indeed, a very accurate statement of the differences between the hydrothecæ of the two varieties. As for the gonangia, they in general differ in no particular from those of the British form. Two slight protuberances or papillæ are occasionally visible on opposite sides of the orifice; but I have never seen them any thing like so large as they are represented in Dr. Coughtrey's figure (*Trans. N.Z. Inst. pl. xx. fig. 16*). I have no specimens exactly corresponding to *S. trispinosa*, Coughtrey; but I have little doubt that it is in reality a mere variety of the present species.

If this form be correctly assigned to *Sertularia operculata*, the range of that species will be indeed almost universal. Besides its occurrence in Natal and at the Cape of Good Hope, as already mentioned, Mr. Hincks records it from Patagonia, the Falkland Islands, the Auckland Islands, and Kerguelen's Land. It did not, however, occur in the collections brought home from the last-named locality by the Transit-of-Venus expedition (*Allman, Ann. & Mag. Nat. Hist., Feb. 1876*). I possess a specimen from the Strait of Magellan, collected by Dr. C. Forbes.

Sertularia furcata, a small species common on the Pacific coast of North America, is undistinguishable from the present one so far as the form of hydrothecæ and gonangia is concerned (*Trask, Proc. Calif. Acad. March 1857; Clark, Trans. Conn. Acad. vol. iii. p. 258*).

Sertularia operculata (?) is of very common occurrence in New Zealand and Australia. There are two very distinct varieties, as, indeed, is, I think, the case with our British specimens. The first is brown in colour, and forms dense short tufts, 2 or 3 inches in height. The second variety is of a yellowish hue, and occurs in long, trailing, dichotomously branching shoots, often 2 (according to Kirichenpauer 3 or 4) feet in height. This is not merely a difference of age.

β. Type form *S. abietina*, Linn.

Sertularia elongata, Lamouroux. (*Pl. XVIII. figs. 2-2 c.*)

Sertularia millefolium (?), Lamarck, *Hist. des Anim. sans Vert. vol. ii. p. 116*.

Dynamene abietinoides, Gray, *Dieff. N. Zealand, vol. ii. p. 294*.

Sertularia abietinoides, Hutton, *Trans. N.Z. Inst. vol. v. p. 256; Coughtrey, Trans. N.Z. Inst. vol. vii.*

Trophosome. *Hydrorhiza* forming a close, strong, fibrous

network. Hydrocaulus attaining a height of 4 or 5 inches, and giving off at close intervals alternate pinnæ, which, towards the upper part of the hydrocaulus, are themselves pinnate. Joints, on stem, just below the points of origin of the pinnæ; on pinnæ, between each pair of hydrothecæ. Hydrothecæ in pairs, subalternate, tubular, smooth, diverging for about half their length; orifice furnished with six long pointed teeth.

Gonosome. Gonangia springing from a point just below the base of a hydrotheca, large, elongate, inversely conical, truncate, smooth, with two long teeth or spines on opposite sides of the orifice; aperture slightly marginate, minutely dentate.

Localities. George Town, Bass's Straits, &c. (*Dr. Harvey*); Cape Wilson, Port Philip, &c. (*Dr. Ferd. Müller*). [New Zealand (*Gray, Hutton, and Coughtry*).]

The figure of this species, though somewhat rough, and the description, though, as usual, short, which are given by Lamouroux in his 'Polypiers flexibles,' are amply sufficient to determine his specimens as coinciding with the *Sertularia abietinoides* of later authors.

One of the specimens sent home by Dr. Ferd. Müller is marked, in his handwriting, "*Sertularia pennigera*, Lamarck." I am unable to find any reference to such a species; but *S. millefolium*, Lamarck, appears to coincide very closely with the present form.

The species appears to be a very abundant one, and, at the same time, shows a very considerable tendency to variation.

In colour my specimens range from a dark brown or black to an indescribable greenish hue, which Lamouroux seems to have tried to render by "vert-rougeâtre foncé." The latter variety seems altogether more lax and delicate; the hydrothecæ are longer and more divergent, the pinnæ longer, the whole hydrocaulus more graceful and feathery. The gonangia also, which in the ordinary form are restricted to the main stem, in this one occur also on the pinnæ, though apparently never more than a single one to each.

This zoophyte forms dense and luxuriant masses, overgrowing shells, the stems of *Fuci*, &c. &c. The teeth upon the margins of the hydrothecæ are often so long and sharp that Lamouroux described them as cilia ("marginibus ciliatis"). As a general rule the two teeth on the side nearest the stem or pinna are separated by a wider interval than occurs between the rest.

Sertularia pulchella, sp. nov. (Pl. XVIII. figs. 3, 3 a.)

Sertularia bicuspidata (?), Lamarck, Hist. Nat. des Anim. sans Vert. vol. ii. p. 121.

Trophosome. Hydrorhiza consisting of a long slender fila-

ment, not anastomosing, creeping over seaweeds. Hydrocaulus attaining a height of about $\frac{1}{2}$ inch, flexuous, giving off alternate pinnae at short intervals. Hydrothecæ in pairs, opposite or subalternate, one pair to each internode on the pinnae. Joints on the main stem immediately below the points of origin of the pinnae. A hydrotheca in the axil of each pinna. Hydrothecæ small, flask-shaped, divergent; aperture small, looking directly upwards, with two sharp teeth. Colour reddish brown.

Gonosome. Gonangia large, about five times as long as the hydrothecæ, one to each hydrocaulus, arising from a point just below the base of a hydrotheca, very near the bottom of the main stem; smooth, obovate, truncate at the top, with two long spines on opposite sides of the orifice; margin everted; orifice destitute of teeth.

Locality. George Town (*Dr. Harvey*).

Sertularia bicuspidata, a species described by Lamarck (*loc. cit.*) from an unknown locality, seems to differ little from the present form, so far as can be judged from the short description given of it. Lamarck defines it as "*S. minima*, ramosa, nodulifera; denticulis oppositis, acutis," and adds, "Les petits nœuds bien séparés, sont formés de deux cellules opposées, à pointes divergentes en dehors: longueur, douze millimètres." In the absence, however, of more complete information, I prefer to describe my species under a new name. The hydrothecæ show a considerable resemblance to those of *S. filicula*; and I have therefore, for want of a better word, made use of the expression "flask-shaped," as employed in describing that species both by Dr. Johnston and Mr. Hincks. In my species the form of the hydrothecæ reminds me a good deal of an ancient Roman or Etruscan lamp.

Though *S. pulchella* has no other special characters in common with *S. elongata*, the gonangia so closely resemble those of that species, that a single figure will serve for both. They are, however, a little smaller, and the circlet of minute denticles is not present around the mouth.

Sertularia insignis, sp. nov. (Pl. XIX. figs. 1, 1 a.)

Trophosome. Hydrorhiza consisting of a few short fibres, neither branching nor anastomosing. Hydrocaulus attaining a height of 6 or 7 inches; pinnae opposite. Hydrothecæ tubular, uncontracted, rather long; the orifice with about six small rounded teeth, those on the main stem divergent at right angles, *opposite*; those on the pinnae diverging slightly upwards, *alternate or subalternate*. Colour yellow.

Gonosome. Gonangia springing from the base of the pinnae,

close to the main stem ; oblong, much elongated, about eight times the length of the hydrothecæ, having two long divergent spines at the top ; orifice small, inconspicuous.

Locality. George Town (*Dr. Harvey*).

This singular and beautiful species is at once distinguished by the abnormal arrangement of the hydrothecæ, which marks it out as widely separated from every other species of Sertularian with which I am acquainted. The *Dynamene sertularioides* of Lamouroux (a species of which I can find no further mention in more recent authors) is defined by him as "*D. cellulis sæpe subalternis*;" but though somewhat approaching my species in this character, it differs from it entirely in many other points, *e. g.* in height, in colour, and in the absence of teeth on the margins of the hydrothecæ ("bord entier ; grandeur 2 à 3 centimètres ; couleur brune").

The long upright stems and short pinnæ, almost perpendicular to the main stem, give this species a handsome and conspicuous appearance.

THUIARIA, Allman.

Thuiaria subarticulata, Coughtrey.

Thuiaria articulata, Hutton, Trans. N.Z. Inst. vol. v. p. 258.

Thuiaria bidens, Allman, Journ. Linn. Soc. vol. xii. p. 269.

A few specimens of this species are contained in the collection. They agree admirably with Prof. Allman's excellent figure, and with the descriptions given both by him and Dr. Coughtrey. These descriptions differ in one single important point only : according to Dr. Coughtrey the pinnæ are subalternate ; according to Dr. Allman and Captain Hutton they are alternate. The latter is distinctly the case in my specimens. Dr. Coughtrey has precedence of Prof. Allman by only a few months in regard to the naming of this species.

Thuiaria dolichocarpa, Allman.

The present collection contains a single specimen only of this rare and handsome species, obtained by Dr. Jolliffe at Hokianga, New Zealand.

It differs in no particular, except in the slightly less conspicuous marginal teeth, from the only other known specimen, figured by Prof. Allman in the 'Journal' of the Linnean Society, vol. xii. p. 270.

My specimen was found in October 1851, probably in about 15 fathoms water.

Thuiaria monilifera.

Sertularia monilifera, Hutton, Trans. N.Z. Inst. vol. v. p. 256; Cough-
trey, *ibid.* vol. vii. p. 282, &c.

Thuiaria cerastium, Allman, Journ. Linn. Soc. xii. p. 271.

The very excellent figures and description given by Prof. Allman leave no doubt whatever as to the identity of his species with *S. monilifera* of Captain Hutton and Dr. Coughtrey. The latter gentleman, in a paper communicated to the Ann. & Mag. Nat. Hist. (Jan. 1876), expressed considerable doubt as to the generic relations of this curious species, and appears to have become convinced that, to whatever genus it should be relegated, it could not be retained in *Sertularia*. According to Prof. Allman's definition of the genus, however, the present form is quite admissible as a species of *Thuiaria*.

My collection contains a single example from Hokianga, New Zealand, collected by Dr. Jolliffe, and differing from Allman's figure only with regard to the gonangia, which are considerably narrower and less tumid in my specimens. In this respect they approach very closely to Dr. Coughtrey's figure (*l. c.*). According to Captain Hutton's original description, the apertures of the hydrothecæ are entire or furnished with two obtuse teeth; these latter, which are only indistinctly visible in my specimen, have been overlooked by Dr. Allman.

Thuiaria ambigua, sp. nov. (Pl. XIX. figs. 2, 2 a.)

Sertularia — ?, Coughtrey, Ann. & Mag. Nat. Hist. Jan. 1876, p. 29, note.

Trophosome. Hydrorhiza small, consisting of short twisted fibres. Hydrocaulus attaining a height of about 6 inches, dark brown in colour. Main stem very much stouter than the pinnæ. Pinnæ alternate or subalternate, short. A number of large branches arise in a cluster near the upper part of the stem. Hydrothecæ—on the pinnæ, opposite, in pairs, closely adnate, a joint between every three or four pairs; on the stem, in two rows, one going up each side, with very short interspaces; tubular, deeply immersed, smooth; orifice with two broad lateral teeth.

Gonosome. Gonangia attached to the main stem and principal branches, close to the origin of the pinnæ; large, obovate, smooth, margin slightly everted, operculate.

Locality. Sealer's Cove (Dr. Ferd. Müller).

I am not quite confident about the generic relations of this species; but I think that it will most naturally come under *Thuiaria* as newly defined by Prof. Allman (Journ. Linn. Soc. vol. xii. Zool.; see also 'Hydroids of the Gulf-Stream').

I have little doubt that it coincides with the form noticed (and partly figured) by Dr. Coughtrey from Bluff Harbour, New Zealand, though the pinnæ, according to his description, are jointed between each pair of hydrothecæ. My specimens show the singular and conspicuous joint, to which he also refers, by which the pinnæ arise from the main stem.

PERICLADIUM, Allman (modified).

Trophosome. Hydrothecæ more or less immersed, and closely set on all sides of stem and pinnæ.

Gonosome. Gonangia scattered, springing from between the hydrothecæ.

The above definition differs from that originally given by Prof. Allman in one point only, viz. in the omission of the clause relating to the general habit of the zoophyte. It stood as follows:—"Hydrothecæ more or less immersed, and closely set round *bifurcating ramuli*, which spring from the sides of a common stem." Although this was a marked and prominent feature of the species (a Japanese one) for which the genus was originally created, yet the arrangement of the hydrothecæ is a still more important point, and the species about to be described agrees so closely in this respect with the type form that it is impossible to place the two in different genera. Prof. Allman, to whom I referred the point, agrees entirely with me on this matter, and says that "in young specimens and portions situated near the base of old ones, the ramification may be simple and pinnate, assuming only in adult specimens the normal character."

Pericladium novæ-zelandiæ, sp. nov. (Pl. XIX. figs. 3, 3 a.)

Trophosome. Hydrocaulus attaining a height of about 8 inches. Main stem undivided, stout, cylindrical, and tapering from the base upwards. Pinnæ for the most part alternate and subalternate, absent for about 2 inches at the base. Hydrothecæ very closely set, shortly tubular, adherent almost their whole length; aperture wide, with about four small rounded teeth.

Gonosome. Unknown.

Locality. Pandora Bank, off Cape Maria Van Dieman, New Zealand, 15 fathoms (*Dr. Jolliffe*).

I am much pleased to be able to make known this new and singular species. The two specimens I possess are, unfortunately, far from perfect: the hydrorhiza is wanting; they are destitute of gonangia; and the hydrothecæ are a good deal shrivelled. They are covered in every part with diatoms,

showing obviously that they were dead specimens when first obtained.

The pinnæ are in no case bifurcate or branched in any way, but show traces of an approach to the whorled or spiral arrangement so characteristic of the other species.

The stem is seen upon section to be a simple hollow tube; and the pinnæ are united to it by distinct joints. With this exception the zoophyte is jointless.

EXPLANATION OF THE PLATES.

PLATE XVI.

- Fig. 1. *Sertularella neglecta*, sp. nov.
 Fig. 2. *Sertularella* (?) *fruticosa*, Esper; 2 a, upper part of hydrocaulus of *S. fruticosa*, natural size.
 Fig. 3. *Sertularella exigua*, sp. nov.
 Fig. 4. *Sertularella*, sp.
 Fig. 5. *Sertularella ramosa*; 5 a, the same, natural size.

PLATE XVII.

- Fig. 1. *Sertularia flexilis*, sp. nov.; 1 a, the same, natural size.
 Fig. 2. *Sertularia flosculus*, sp. nov.; 2 a, the same, natural size.
 Fig. 3. *Sertularia minima*, sp. nov., magnified one third more than the other species; 3 a, *S. pumila*, Linné, outline magnified to the same scale as the figure of *S. minima*; 3 b, *S. minima*, a colony, natural size, attached to a piece of seaweed.
 Fig. 4. *Sertularia australis*, Kirchenpauer; 4 a, the same, natural size.

PLATE XVIII.

- Fig. 1. *Sertularia*, sp.; 1 a, the same, side view of the hydrothecæ; 1 b, the same, natural size.
 Fig. 2. *Sertularia elongata*, Lamouroux; 2 a, the gonangium, magnified to half the scale of fig. 2; 2 b, the same, natural size; 2 c, *S. elongata*, var., natural size.
 Fig. 3. *Sertularia pulchella*, sp. nov.; 3 a, the same, natural size.

PLATE XIX.

- Fig. 1. *Sertularia insignis*, sp. nov.; 1 a, the gonangium.
 Fig. 2. *Thuiaria ambigua*, sp. nov.; 2 a, the same, natural size.
 Fig. 3. *Pericladium novæ-zelandiæ*, sp. nov.; 3 a, the same, natural size.

NOTE.

The above was written and had left my hands prior to the publication of M. Mereschkowsky's paper in the 'Annals' for December 1878. According to the method followed in that paper, and originally suggested by the Rev. A. M. Norman, my *Pericladium novæ-zelandiæ* should be referred to the genus *Selaginopsis*, of which it would then constitute the only example yet recorded from the southern hemisphere.

The hydrothecæ on the axial stem occur in nine or ten longitu-
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dinal series: upon the pinnæ they are absent for a very short distance at the base; then a single one appears first upon the lower aspect of the branch; and the series thence ascends in a close spiral. Afterwards the spiral arrangement becomes lost or obscured, and we see simply the longitudinal rows, which on the pinnæ seem not to exceed the number of five or six. But, as M. Mereschkowsky has observed in the case of *S. decemserialis*, this limit is not to be considered absolutely constant; for since the fundamental arrangement is a close spire, the apparent number of rows of hydrothecæ will always depend upon the thickness of the pinna they surround.

The present species seems to be most nearly related to *S. mirabilis*, Verrill, from which, however, it differs markedly in the numerous rows of hydrothecæ on the main stem, these being reduced to two in the allied species.

However similar all the species which have been ascribed to *Selaginopsis* are as regards the form and general arrangement of the hydrothecæ, I am yet doubtful whether a generic separation might not still be made with advantage between those forms which are simply pinnate and those whose branches lie in all planes or are disposed in a more or less irregular manner.

XI.—On the Bryozoa (*Polyzoa*) of the Bay of Naples.

By ARTHUR WM. WATERS, F.G.S.

[Plates XII.—XV.]

[Continued from p. 43.]

THE same plan will be followed in this as in the previous part, of only giving the synonyms where there is any special reason for doing so; but for the long list of synonyms which most species possess the reader is referred to the works of Smitt and Busk.

CHEILOSTOMATA (*continued*).

34. *Aetea anguina*, L., forma *recta*. (Pl. XV. fig. 7.)

Aetea recta, Hincks, Cat. of Zooph., Ann. & Mag. Nat. Hist. 3rd ser. vol. ix. p. 25, pl. vii. fig. 3.

Aetea anguina, forma *recta*, Smitt, Krit. Fört. 1867, p. 281, pl. xvi. figs. 5, 6.

? *Aetea ligulata*, Busk, Cat. Mar. Polyz. p. 31, pl. xlii.

The difficulty is very great as to the position of *Aetea*, as it has relationships with the Cheilostomata and also with the Ctenostomata (in having a collar as seen in the Naples specimens, and which Smitt pointed out in 1867); and whether it will have to be placed in a new suborder (*Stolonata*, Claus,